Available online at www.sciencedirect.com

ScienceDirect

Currents in Pharmacy Teaching and Learning 7 (2015) 864–868

Currents in Pharmacy Teaching & Learning

http://www.pharmacyteaching.com

Short communication

Designing training for teaching environmental toxicology to specialized pharmacists

Antonio Peña-Fernández, PhD[a,b,*], María José González-Muñoz, PhD[a], María de los Ángeles Peña, PhD[c]

[a] *Unidad de Toxicología, Departamento de Ciencias Biomédicas, Universidad de Alcalá, Alcalá de Henares, Madrid, Spain*
[b] *School of Allied Health Sciences, De Montfort University, The Gateway, Leicester LE1 9BH, UK*
[c] *Departamento de Ciencias Biomédicas, Unidad de Farmacia y Tecnología Farmacéutica, Universidad de Alcalá, Alcalá de Henares, Madrid, Spain*

Abstract

Introduction: The Toxicology Unit at the University of Alcalá (Spain) started to provide a novel short-term training course in environmental toxicology for pharmacists enrolled in the postgraduate specialty "Specialist in Industrial Pharmacy and Galenicals" in 2013-2014. This specialty is only available to state-board certified pharmacists considering enrolling in a specialized health training program.
Objective: The objective was to create a short, dynamic, and interactive highly specialized training workshop to introduce future professionals to the subject of environmental toxicology and public health. The success of this novel short training course and the interest of the students in environmental toxicology were also analyzed.
Methods: A specialized training workshop in environmental toxicology was developed for pharmacists who often have a limited knowledge of environmental health. The training workshop consisted of both theoretical and practical sessions. The practical exercise was highly dynamic and involved identifying potential human risks from pharmaceuticals and care products in water environments as well as the development of a protection and remediation strategy.
Results: Following successful training pharmacists demonstrated good understanding of the source-pathway-receptor model and were capable of tailoring strategies to protect human health and future generations.
Conclusions: The novel short training course was successful in developing postgraduate students' knowledge of environmental toxicology by providing a practical introduction to environmental health. The methods described here may be used for designing longer training events or courses of environmental toxicology for pharmacists who wish to work in the industry.
© 2015 Elsevier Inc. All rights reserved.

Keywords: Teaching environmental toxicology; Training development; Specialized training; Postgraduate pharmacists; Risk assessment; Recovery and restoration

Introduction

There is an increasing need for toxicology knowledge when working in industry, public, and private sectors.[1,2] In particular, the health sector is attracting more workers with skills in environmental health due to the large burden of disease and mortality caused by environmental pollutants. Therefore, the study of environmental health and toxicology should be part of the education of all professionals in health sciences. The study of this topic also provides a vision in risk assessment, human exposure, and health protection that is relevant for professionals wanting to work in the health sector. For example, the chemical and

* Corresponding author: Antonio Peña-Fernández, PhD, Unidad de Toxicología, Departamento de Ciencias Biomédicas, Universidad de Alcalá, Crta. Madrid-Barcelona Km, 33.6, 28871 Alcalá de Henares, Madrid, Spain.
E-mail: antonio.pena-fernandez@dmu.ac.uk

http://dx.doi.org/10.1016/j.cptl.2015.08.015
1877-1297/© 2015 Elsevier Inc. All rights reserved.

pharmacy sectors are demanding chemists and pharmacists with an education in toxicology since the public's perception of these industries is not favorable.[3] As a consequence, the International Union of Pure and Applied Chemistry (IUPAC) has created a distance learning program in toxicology adapted to chemists.[4]

In general, environmental toxicology is not taught in sufficient detail in health sciences such as pharmacy, nursing, or medicine in the European Union. Therefore, postgraduate students need to enroll in specialized courses or masters degrees to complete their training in this area of specialization. This issue has been comprehensively described in a recent monograph[5] about the status of Toxicology teaching in Spain.

As a result, the Toxicology Unit at the Department of Biomedical Sciences at the University of Alcalá (Spain) has developed a highly specialized short training session (theoretical and practical) on environmental toxicology specifically designed for pharmacists. This training was provided to students enrolled in the specialty "*Specialist in Industrial Pharmacy and Galenicals*" in 2013–2014 at the Pharmacy and Pharmaceutical Technology Unit, University of Alcalá.[6] This pharmacy specialty consisted of two official programs over two years: the first one consists of the provision of concepts (Programme of Education) followed by a Programme of Practice that involves working for a number of months in a given pharmaceutical laboratory (a minimum of 1300 h); the complete official program is comprehensively described on the university website.[6] This specialization is regulated by the Spanish Government,[7] and the aim is to provide the postgraduate pharmacist with the necessary knowledge of research processes, development, and production of pharmaceuticals and drugs, and how these processes should comply with the law and good manufacturing practice to ensure the safety, efficacy, quality, and control of medicinal products. The specialty is available to students who have successfully completed a state examination only accessible to pharmacists for enrolling in a specialized health training program titled "Pharmacist Internal Resident" (known by its Spanish acronym FIR). It is expected that these specialized pharmacists will work in the pharmaceutical industry and health sector.

The short training session on environmental toxicology created by the professors at the Toxicology Unit was approved by the Director and professors who coordinate the pharmacy specialty at the University of Alcalá. The aim of this highly specialized training was to introduce pharmacy professionals to the subject of environmental toxicology by providing them with basic skills of risk assessment to protect human health. The training course created is a highly dynamic and interactive training workshop developed for pharmacists with a basic knowledge in environmental toxicology. Students are introduced to the use of different methodologies, tools, and resources developed in different countries (e.g., the risk assessment methodology designed by the United States Environmental Protection Agency[8]) to protect human health and the environment. At the end of the training, the students should be able to identify risks from environmental pollutants and implement basic actions to decontaminate and restore contaminated environments affected by chemicals and/or pharmaceuticals using relevant resources on the internet.

The degree of participation and interest shown by the students was also monitored to evaluate the effectiveness of this short training course. The students' feedback will be used to make appropriate modifications to the training course for future years.

Methods

The specialized training, totaling five hours, consisted of two teaching approaches: one mainly theoretical and the other predominantly practical. A previous screening of the students' knowledge on environmental toxicology was conducted before the theoretical session with the objective of adapting the content of the training course and to identify any misconceptions. The pre-test involved questions, class discussions and participation in the first 15 min of the class. After this, an overview of the risk assessment to protect human health was provided (theoretical session, first part of the training: two hours). Case studies were used throughout this session to demonstrate the application of human health risk assessment methods. The content was: (a) environmental hazards and identification; (b) description of the source-pathway-receptor model; (c) introduction to risk assessment tools developed by the U.S. Environmental Protection Agency (U.S. EPA)[8]; and (d) analysis of two case studies. The case studies analyzed were: ban on the use of lead in petrol[9,10] and health problems associated with phthalates in children's products and toys and their regulation.[11,12] Phthalates are plasticizers that are added to plastic products, such as toys, to impart flexibility and durability. However some phthalates can cause liver, kidney, and reproductive problems and are considered to be endocrine disruptors.[13] The introduction of these concepts was basic to make them generally accessible; active participation and reasoning was sought from the students by formulating questions and analysis, and an understanding of case studies.

To provide the most up-to-date training on risk assessment, the practical exercise (second part of the training; three hours) consisted of the completion of a risk assessment study, identification of environmental and human risks, and planning possible protection and remediation strategies to protect humans. The scenario proposed (affected environment) was an area impacted with pharmaceuticals and personal care products (PPCPs): a local fishing and mollusk harvesting area severely impacted by veterinary diclofenac, parabens (preservatives used in skin care products), and a mixture of ultraviolet (UV) filters (organic and inorganic chemicals for skin protection against UV radiation). PPCPs are emerging pollutants frequently found in water environments due to their use and

Download English Version:

https://daneshyari.com/en/article/10313309

Download Persian Version:

https://daneshyari.com/article/10313309

Daneshyari.com